

⁽¹²⁾ UK Patent Application ⁽¹⁹⁾ GB ⁽¹¹⁾ 2 320 225 ⁽¹³⁾ A

(43) Date of A Publication 17.06.1998

(21) Application No 9724862.9

(22) Date of Filing 26.11.1997

(31) 8625705

{32} 11.12.1996

(33) GB

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(51) INT CL⁶

B41J 2/325 , G09F 3/02

(52) UK CL (Edition P)

B6F FAN

B8F FBG

(56) Documents Cited

WO 96/10489 A1 US 5215383 A

(58) Field of Search

UK CL (Edition P) B6C CBAD CBDA , B6F FAN , B8F
FBG

INT CL⁶ B41F 17/10 17/20, B41J 2/325 3/407, G07B
1/00, G09F 3/02, H01B 13/00

(54) Thermal transfer printer for electric cable markers in strip form

(57) Printed markers are formed by feeding the strip or flattened length of tubing 19, (Fig.7) wound onto a rotatable reel 30 past a printhead 36 via a pair of guide members 42 that prevent the strip from moving sideways. Two lengths of tubing 10a, 10b, (Figs 2 and 3) interconnected by a carrier 11 can be printed simultaneously and detached from the carrier by tearing along perforations 13 to form individual markers. One or more lengths of perforated tubing (15, Fig.4) can be supplied adhered to a paper carrier (16) and presented on a roll so that individual printed markers may be randomly selected.

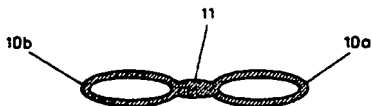


FIG. 2

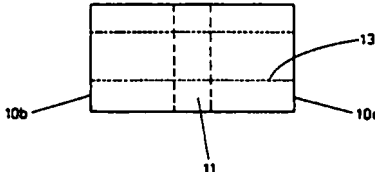


FIG. 3

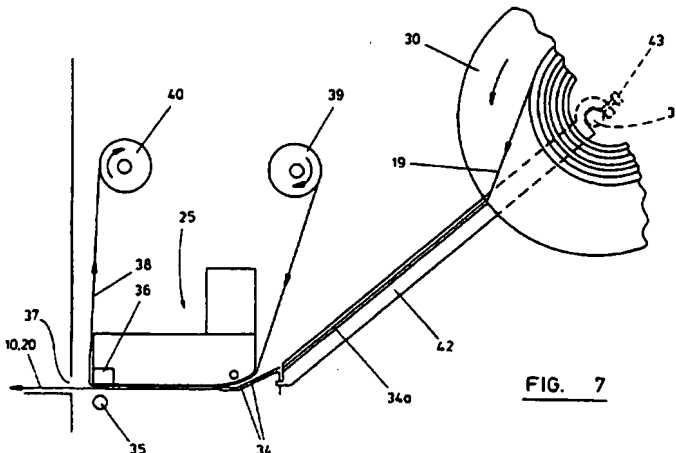


FIG. 7

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

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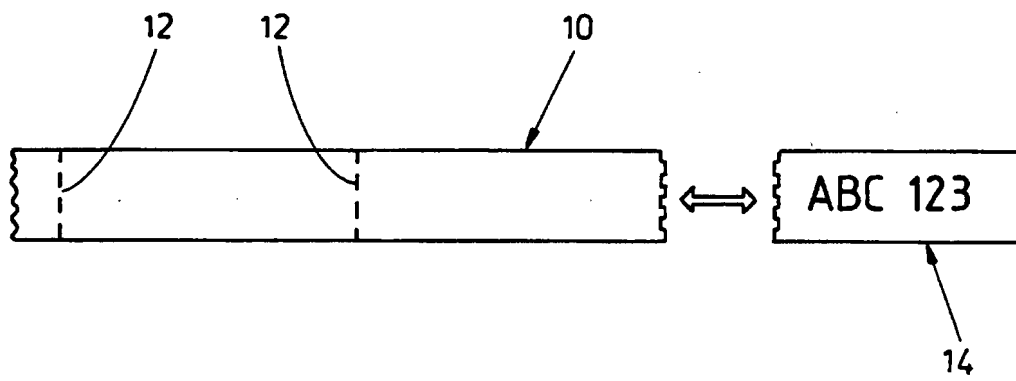


FIG. 1

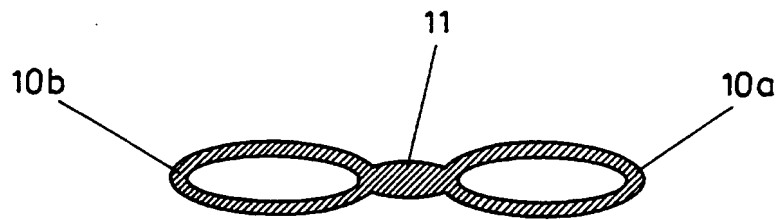


FIG. 2

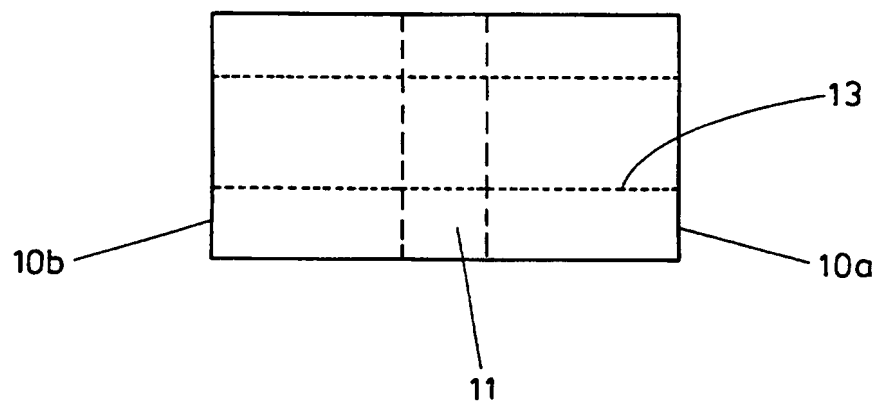


FIG. 3

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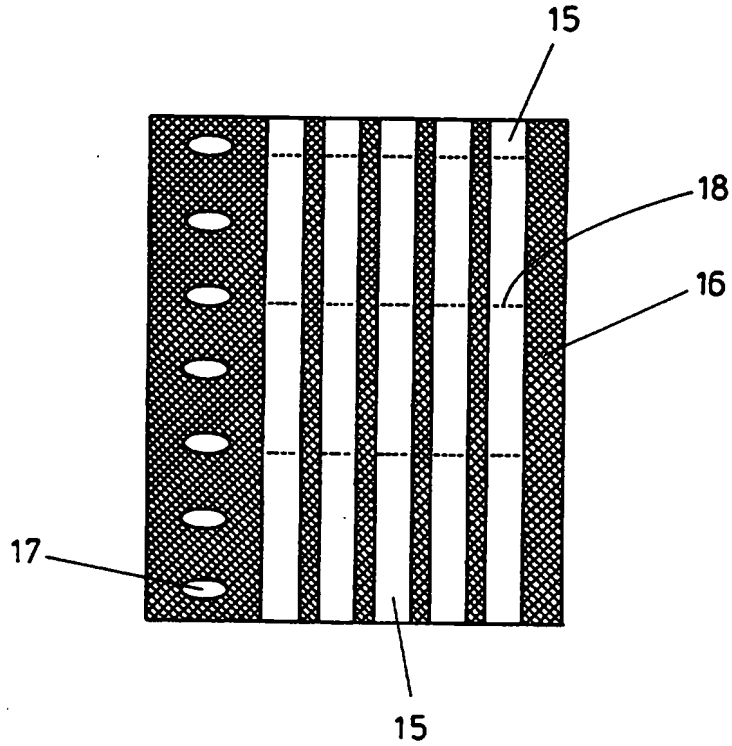


FIG. 4

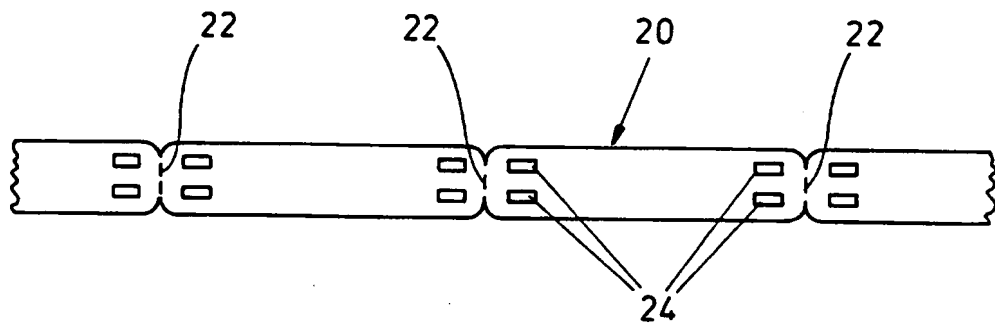


FIG. 5

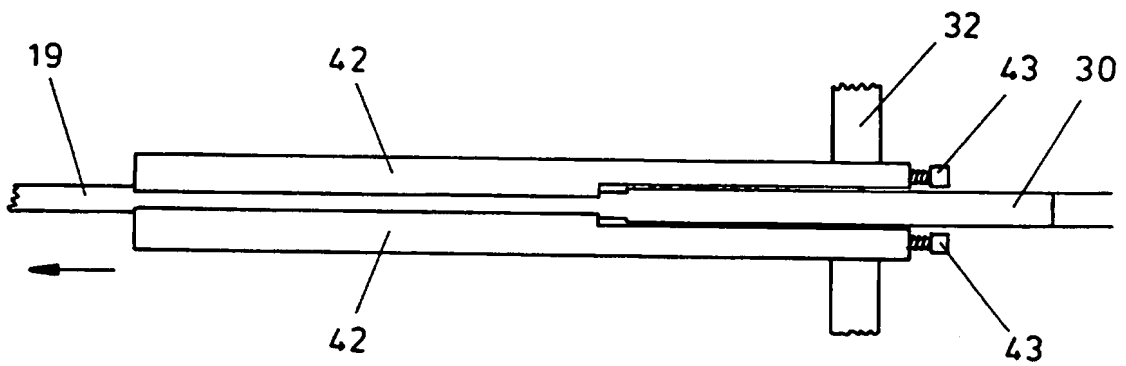


FIG. 6

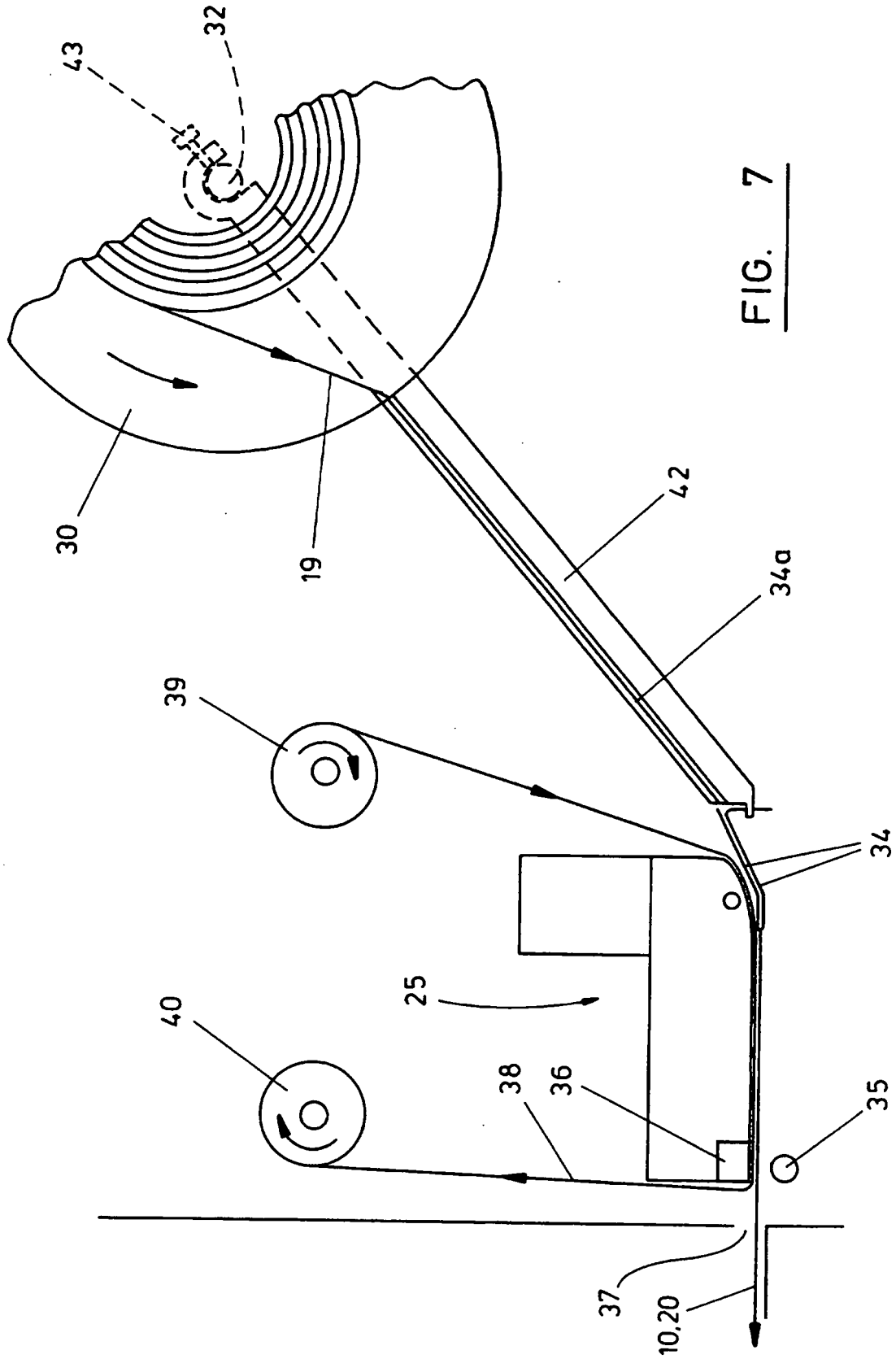


FIG. 7

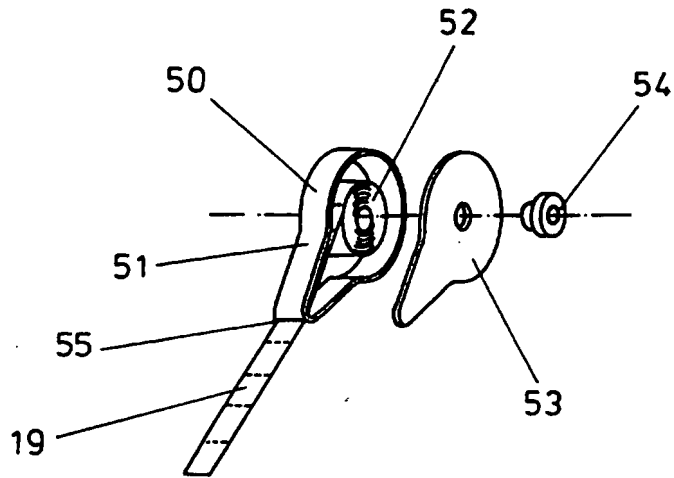


FIG. 8

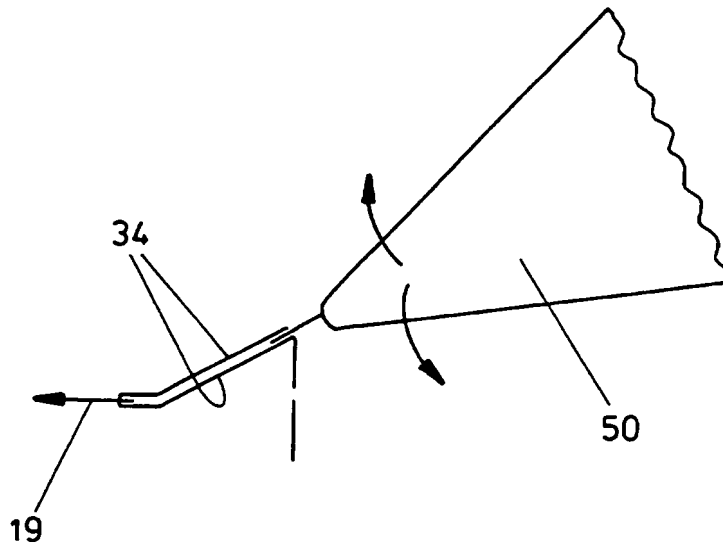


FIG. 9

Printed Markers

The present invention relates to printed markers for identifying electric cables, for example.

It is a common practice to provide tubular printed markers which are slipped onto individual cables. These
5 tubular markers may be heatshrinkable or non-heatshrinkable. It is also common to provide markers as flat strips, which are attachable to individual cables. The known types of markers are supplied either supported on a ladder-type of bandolier or on a paper backing, and are fed through the printer
10 transversely: the markers are accordingly restricted to predetermined lengths.

We have now devised arrangements which offer significant advantages relative to the arrangements which have been provided hitherto.

15 In accordance with the present invention, there is provided a thermal transfer printer arranged to receive a wound length of elongate strip or flattened tubing, the printer having a thermal transfer print head and means for guiding the strip or tubing past the print head, the guiding means being
20 arranged to constrain the strip or tubing against lateral displacement as it advances through the print head.

Preferably the printer is arranged to receive a wound length of strip or tubing of selected width. Preferably the printer is arranged to receive two or more wound lengths of
25 strip or tubing, side-by-side.

The strip or tubing may be wound onto a reel, which is then mounted for rotation. The guiding means in this case comprises a pair of elongate guides which extend from the reel towards the print head, the elongate guides having inwardly-
30 facing edges which are formed with longitudinal grooves in which the opposite edges of the strip or tubing are slidably received. These elongate guides may comprise two separate members which can be engaged, either side of the reel, onto a spindle on which the reel is fitted. Instead, the elongate
35 guides may be mounted to the reel, so that the reel and guides form a single unit for fitting into the printer. The strip or

tubing may be printed on one side, and rewound onto the same or different reel, which is inserted into the printer for printing onto the opposite side of the strip or tubing.

In an another embodiment, the elongate strip or tubing
5 may be wound within a cassette, having an exit slot through which the feedstock passes. In this case, preferably the cassette includes a portion which projects radially outwardly and includes the exit slot at its outer end, so that opposite side walls of this projecting portion constrain the strip or
10 tubing against transverse displacement as it advances towards the print head. Preferably the cassette is arranged so that it can be reversed, to enable the strip or tubing to be printed on either side: in particular, the strip or tubing can be printed on one side, then rewound into the cassette, for the
15 cassette then to be turned over to enable printing on the opposite side of the strip or tubing. Preferably therefore, the cassette is symmetrical about a plane which contains its exit slot and the axis around which the strip or tubing is wound.

20 Also in accordance with the present invention, there is provided a thermal transfer printer in combination with a length of elongate strip or flattened tubing, the printer having a thermal transfer print head and means for guiding the strip or tubing past the print head, the guiding means being
25 arranged to constrain the strip or tubing against lateral displacement as it advances through the print head.

The strip or tubing is preferably preformed with transverse lines of weakness at intervals along its length, to define successive markers. The lines of weakness may be
30 provided by a line of perforations or by a partial cut through the thickness of the material: however, the lines of weakness may be formed at any desired intervals, so forming markers of any desired lengths.

Preferably, the printer comprises means for sensing the
35 position of the successive markers, so that it can determine how far to advance the strip or tubing between each print.

Preferably, the strip or tubing comprises markings on its successive markers, which markings can be sensed by said position sensing means. Preferably, the markings are

substantially invisible to the naked eye under normal illumination conditions.

Preferably, the strip is semi-rigid. Preferably, the strip comprises an adhesive backing.

5 A disadvantage of cutting or tearing markers from a length of markers is that the length of markers becomes fragmented, with the result that some markers can become lost. This is a particular problem where is each marker is printed differently and selected markers are then cut at random from
10 the length.

In order to overcome this problem, the strip or tubing is preferably joined to an axially extending carrier which keeps the remaining markers together once markers have been cut or torn from the length.

15 In one embodiment, the edge of the strip or tubing is connected to the edge of the carrier. Preferably, two lengths of strip or tubing are mounted side-by-side to respective opposite side edges of the carrier. Preferably, the or each length of strip or tubing is frangibly connected to the
20 carrier.

In an alternative embodiment, the strip or tubing is mounted on an elongate carrier of sheet material such as paper, the strip or tubing being disposed between opposite side edges of the carrier. Preferably, a plurality of strips and lengths
25 of tubing coextend along the carrier.: This format aids alignment, since the carrier can be tractor-fed, say by means of perforations extending along the length of the carrier.

Also in accordance with the present invention, there is provided a method of forming printed markers, comprising
30 advancing an elongate strip or length of flattened tubing longitudinally of itself through a thermal transfer printer and printing indicia at successive longitudinal intervals onto said strip or tubing.

The strip or tubing may be formed with transverse lines
35 of weakness after it has been printed.

Further in accordance with the present invention, there is provided feedstock for forming individual markers, comprising an elongate strip or a flattened length of tubing, formed with transverse lines of weakness at intervals along its

length, to define successive markers.

Yet further in accordance with the present invention, there is provided a series of markers formed on an elongate strip or length of flattened tubing, said strip or tubing being
5 formed with transverse lines of weakness at intervals and carrying printed indicia between the adjacent pairs of lines of weakness.

Embodiments of the present invention will now be described by way examples only and with reference to the
10 accompanying drawings, in which:

FIGURE 1 is a plan view of a first embodiment of feedstock in the form of flattened tubing;

FIGURE 2 is sectional view through a second embodiment of feedstock in the form of two lengths of tubing mounted side-
15 by-side to a carrier;

FIGURE 3 is a plan view of the feedstock of Figure 2;

FIGURE 4 is a plan view of a third embodiment of feedstock in the form of lengths of strip or flattened tubing mounted on a carrier;

20 FIGURE 5 a plan view of a fourth embodiment of feedstock in the form of elongate strip;

FIGURE 6 is a schematic side view of a thermal transfer printer in accordance with the invention;

FIGURE 7 is a plan view of a guide arrangement of the
25 printer;

FIGURE 8 is a view of a cassette in accordance with the invention; and

FIGURE 9 is a view of the cassette fitted into the thermal transfer printer of Figure 6.

30 Referring to Figure 1, there is shown a portion of a length of tubing 10 which has been flattened by being passed between a pair of rollers under moderate heat. The tubing may be heatshrinkable or non-heatshrinkable, and comprises a plastics material e.g. PVC or a polyolefin. The tubing is semi-
35 severed across its width at periodic intervals, as indicated at 12, so that individual markers, once printed, can be torn from it, as indicated at 14.

Referring to Figures 2 and 3 of the drawings, two lengths of flattened tubing 10a, 10b are arranged side-by-side

and are interconnected by a solid carrier 11. The lengths of tubing 10a,10b can be printed simultaneously using a single printer.

Once printed, the lengths of tubing 10a,10b can be
5 detached from the carrier 11 using a simple tearing action. Both lengths of tubing 10a,10b are semi-severed across their width at periodic intervals, as indicated at 13, so that selected individual markers can be detached from various points along the printed length: the carrier 11 keeps the remaining
10 portions of the tubing 10a,10b together, so that they do not get lost and so that further individual markers can easily be selected.

Referring to Figure 4 of the drawings, one or more lengths of strip and/or tubing 15 can be supplied adhered to
15 a paper carrier 16 and presented on a roll. The carrier 16 comprises a longitudinally extending series of perforations 17 which can be engaged by a toothed drive wheel on the printer, so as to advance the carrier and strip or tubing through the printer. The lengths of strip or tubing are severed across
20 their width, as indicated at 18, so that individual printed markers can be selected at random from the carrier 16, whilst keeping the remaining markers conveniently together.

Figure 5 shows a portion of a length of flat strip 20 which is also semi-severed at intervals along its length, as
25 indicated at 22, to define successive markers. The strip is pre-punched to form each such marker with a pair of rectangular apertures 24 (or alternatively with a single aperture) adjacent each of its opposite ends, for attaching the marker, typically using cable ties, to a cable etc. to be marked.

30 Feedstock 19 of any of the types shown in Figures 1 to 5 may be wound onto a reel 30, which is then fitted into a thermal transfer printer 25 as shown in Figures 6 and 7, for the feedstock 19 to pass the print head 36, where it is printed on as required. The printer 25 comprises a spindle 32
35 projecting from a side wall of the apparatus, and the reel 30 is received on this spindle. The feedstock 19 passes from the reel 30, through a pair of closely-spaced guide plates 34, then over a roller 35 which is positioned under the thermal print head 36, and finally out through a slot 37 in the front of the

printer. A printer ribbon 38 is advanced past the thermal print head, over the feedstock 19, from a reel 39 to a reel 40.

In order to prevent the feedstock 19 wandering sideways as it passes from its reel 30 to the print head 36, a guide arrangement is provided, comprising a pair of elongate guide members 42. At one end, the guide members 42 engage over the spindle 32 either side of the reel 30 and are secured in position by tightening respect screws 43: at their opposite ends, the guide members 42 engage in a slot 34a in a downwardly-bent rear portion of the lower guide plate 34. As shown in Figure 7, there is a gap between the two guide members 42: the inwardly facing edges of the two guide members 42 are formed with longitudinally-extending grooves (one of which is shown at 42a in Figure 6). The opposite edges of the feedstock 19 are received in the longitudinal grooves 42a of the two guide members 42.

In the example shown in Figures 6 and 7, the two guide members 42 are separate from the reel 30 and independently fitted in place, at one end in the slot 34a of the lower guide plate 34 and at the other end on the spindle 32. Instead, the two guide members 42 may be mounted to the reel 30, enabling the reel and guide members to be fitted as a single unit into the printer 25: for example, the two guide members 42 may fit together through the centre opening in the reel.

Two or more reels 30, with their respective guide members, may be mounted side-by-side on the spindle 32, such that their feedstock advance side-by-side past the print head 36. In this way, the corresponding number of feedstock (tubes or strip) may be printed simultaneously.

The feedstock used in the printer may be of a wide range of different widths, the reel 30 being of corresponding width. Where the feedstock is preformed with transverse lines of weakness at regular intervals along its length, then use is made of a graduated support 44 projecting from the front of the printer 25: thus, the feedstock is pulled through until its leading end is aligned with one of the graduations, appropriate for the distance between the successive lines of weakness of that particular feedstock; this ensures that the printing process will be synchronised to the successive markers.

The feedstock may be formed to a profile in cross-section, instead of being flat. In this case, the guide plates 34 and roller 36 may be formed with a correspondingly profiled cross-section.

5 Instead of being wound on a reel, the feedstock may be wound into a cassette as shown in Figures 8 and 9. The cassette comprises a body part 50 having a flat base formed with an upstanding peripheral wall 51 and with an upstanding core 52: the cassette further comprises a flat cover 53 which
10 fits across the open top of the body part 50 and is secured in place by a screw 54 which passes through the cover 53 and into the core 52. The cassette comprises a generally circular main portion, with the core 52 at its centre, from which a tapered portion projects: the end of the latter portion is provided
15 with a slot 55. The feedstock 19 is wound around the core 52 within the cassette and its free end passes outwardly through the slot 55. The core 52 and fastening screw 54 are formed with a through-hole so that the cassette can be mounted on the spindle 32 of the printer, alongside one or more additional
20 cassettes. In passing to the print head, the feedstock 19 is guided by the opposite sides of the cassette and so prevented from wandering sideways. As shown in Figure 9, when the cassette is fitted into the printer, its tapered end terminates a short distance from the entrance to the passageway between
25 the two guide plates 34: the cassette remains free to turn on the spindle 32, and to adopt its own position as the feedstock is drawn past the print head.

It will be noted that the cassette is symmetrical in shape about a plane which contains the exit slot 55 and the
30 axis of the core 52. Thus, its feedstock 19 can be printed on one side, then rewound into the cassette, and the cassette can then be turned over for the feedstock to be printed on its opposite side.

It will be appreciated that the printer can print any
35 desired indicia on the feedstock: the printing may run either lengthwise or transversely of the feedstock. The printing may also include graphics. Further, the printing may be formed to any selected colour, by appropriate choice of the printer ribbon. The feedstock can be of any desired colour, and the

printing may be white (or other light colours) onto black (or other dark colour) feedstock.

The printer may be adapted to accepted large-diameter reels of feedstock, carried on a spindle mounted outside the printer casing. The feedstock may then enter the printer through its rear wall, pass over the spindle 32 of the printer and then be guided by a pair of guide members 42 (as previously described) to the passageway between the guide plates 34.

The flattened tubing feedstock 10 of Figure 1 may be preformed with its successive transverse lines of weakness 12 prior to printing, as shown: alternatively, these lines of weakness may be formed subsequent to the printing. Similarly, the strip 20 of Figure 5 may be formed with its transverse lines of weakness 22 and fixing apertures 24 prior to printing, or subsequent to the printing. Alternatively, the feedstock (particularly the strip 20 of Figure 5) may be supplied in its printed form, without its transverse lines of weakness, for the user to cut individual markers from it.

A particular advantage of using a thermal transfer printer is that the print formed on the feedstock is resistant to touch (in contrast to the print formed by dot matrix printers, which requires "fixing", for example under UV light). Further, the print is itself resistant to UV light, and will therefore not fade over time.

It will further be appreciated that the printer avoids wastage. The reels and cassettes can be re-used. Further, the feedstock is free of contamination: the reels of feedstock can be enclosed in a wrapper until use, whilst the cassettes are enclosed and ensure protection for the feedstock.

Claims

- 1) An assembly comprising a thermal transfer printer in combination with a length of elongate strip or flattened tubing, the printer having a thermal transfer print head and
5 means for guiding the strip or tubing past the print head, the guiding means being arranged to constrain the strip or tubing against lateral displacement as it advances through the print head.
- 2) An assembly as claimed in claim 1, in which the strip
10 or tubing is preformed with transverse lines of weakness at intervals along its length, to define successive markers.
- 3) An assembly as claimed in claim 2, in which the lines of weakness may be provided by a line of perforations through the thickness of the material.
- 15 4) An assembly as claimed in claim 2, in which the lines of weakness may be provided by a partial cut through the thickness of the material.
- 5) An assembly as claimed in any of claims 2 to 4, the printer comprising means for sensing the position of the
20 successive markers.
- 6) An assembly as claimed in any of claims 2 to 5, in which the strip or tubing comprises markings on its successive markers, which markings can be sensed by said position sensing means.
- 25 7) An assembly as claimed in claim 6, in which the markings are substantially invisible to the naked eye under normal illumination conditions.
- 8) An assembly as claimed in any preceding claim, in which the strip is semi-rigid.
- 30 9) An assembly as claimed in any preceding claim, in which

the strip comprises an adhesive backing.

10) An assembly as claimed in any preceding claim, in which the strip or tubing is joined to an axially extending carrier.

5 11) An assembly as claimed in claim 10, in which the edge of the strip or tubing is connected to the edge of the carrier.

12) An assembly as claimed in claim 11, in which two lengths of strip or tubing are mounted side-by-side to
10 respective opposite side edges of the carrier.

13) An assembly as claimed in claims 11 or 12, in which the or each length of strip or tubing is frangibly connected to the carrier.

14) An assembly as claimed in claim 10, in which the strip
15 or tubing is mounted on an elongate carrier of sheet material, the strip or tubing being disposed between opposite side edges of the carrier.

15) An assembly as claimed in claim 14, in which a plurality of strips and/or lengths of tubing coextend along the
20 carrier.

16) An assembly as claimed in any preceding claim, in which the strip or tubing is wound onto a reel, which is mounted for rotation.

17) An assembly as claimed in claim 16, in which the
25 guiding means comprises a pair of elongate guides which extend from the reel towards the print head, the elongate guides having inwardly-facing edges which are formed with longitudinal grooves in which the opposite edges of the strip or tubing are slidably received.

30 18) An assembly as claimed in claim 17, in which the

elongate guides comprise two separate members which are engaged, either side of the reel, onto a spindle on which the reel is fitted.

19) An assembly as claimed in claim 17, in which the
5 elongate guides are mounted to the reel, so that the reel and guides form a single unit for fitting into the printer.

20) An assembly as claimed in claim 17, in which the elongate strip or tubing is wound within a cassette, having an exit slot through which the feedstock passes.

10 21) An assembly as claimed in claim 20, in which the cassette includes a portion which projects radially outwardly and includes the exit slot at its outer end, opposite side walls of the projecting portion being arranged to constrain the strip or tubing against transverse displacement as it advances
15 towards the print head.

22) An assembly as claimed in claims 20 or 21, in which the cassette is arranged so that it can be reversed.

23) An assembly as claimed in claim 22, in which the cassette is symmetrical about a plane which contains its exit
20 slot and the axis around which the strip or tubing is wound.

24) An assembly substantially as herein described with reference to the accompanying drawings.

25) A thermal transfer printer arranged to receive a wound length of elongate strip or flattened tubing, the printer
25 having a thermal transfer print head and means for guiding the strip or tubing past the print head, the guiding means being arranged to constrain the strip or tubing against lateral displacement as it advances through the print head.

26) A thermal transfer printer as claimed in claim 25,
30 arranged to receive a wound length of strip or tubing of selected width.

- 27) A thermal transfer printer as claimed in claim 26, arranged to receive two or more wound lengths of strip or tubing, side-by-side.
- 28) A thermal transfer printer substantially as herein
5 described with reference to Figures 3 and 4 of the accompanying drawings.
- 29) A method of forming printed markers, comprising advancing an elongate strip or length of flattened tubing longitudinally of itself through a thermal transfer printer and
10 printing indicia at successive longitudinal intervals onto said strip or tubing.
- 30) A method as claimed in claim 29, in which the strip or tubing is formed with transverse lines of weakness after it has been printed.
- 15 31) A method as claimed in claims 29 or 30, in which the strip or tubing is printed on one side, and rewound onto the same or different reel, which is then inserted into the printer for printing onto the opposite side of the strip or tubing.
- 32) An method of forming printed markers, the method being
20 substantially as herein described with reference to the accompanying drawings.
- 33) Feedstock for forming individual markers, the feedstock comprising an elongate strip or a flattened length of tubing, formed with transverse lines of weakness at intervals along its
25 length, to define successive markers.
- 34) Feedstock substantially as herein described with reference to Figure 1 or Figure 5 of the accompanying drawings.
- 35) A series of markers formed on an elongate strip or length of flattened tubing, said strip or tubing being formed
30 with transverse lines of weakness at intervals and carrying printed indicia between the adjacent pairs of lines of

weakness.

36) A series of markers formed on an elongate strip or length of flattened tubing, the markers being substantially as herein described with reference to Figure 1 or Figure 5 of the
5 accompanying drawings.



The
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Application No: GB 9724862.9
Claims searched: 1-28

Examiner: Gary Williams
Date of search: 26 January 1998

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:
UK CI (Ed.P): B6C: CBAD,CBDA; B6F: FAN; B8F: FBG
Int CI (Ed.6): B41J:2/325,3/407; B41F: 17/10,17/20; G07B: 1/00; G09F: 3/02;H01B:
13/00
Other:

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	WO 96/10489 A1 (MOORE) See Figs.1&3, page 7 lines 3-8, page 9 lines 21-24	1,2,3,7,9, 16,25,26
X	US 5215383 (CUBIC) See Fig.1, col.3 lines 43-45 & 53-68, col.4 lines 31-65, col.5 lines 13-27	1-8 25

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.